
Centerline Feature Representation

Posted by Bert Granberg - 2009/04/29 13:46

I am trolling for ideas on what a geometry standard should look like. My vision is that there should be a set of hard requirement and soft recommendations. The latter indicates a best practice but not a deal breaker.

Here are some discussion cards:

- 1) When should features be allowed to be broken into separate features between intersections? Jurisdictional boundary attribute changes? speed changes? maintenance or pavement changes? any attribute change? never?.
- 2) Should features be required to be broken at intersections (even though this might mean more work splitting address and milepost ranges?)
- 3) When should streets be divided into a double centerline representation.
- 4) When does a cul-de-sac become large enough to be best represented by a loop? And, should loops be broken so they don't have the same start and end point.
- 5) When two roads cross in separate planes (elevations) due to overpasses, should the features be split with a common intersection point. Should a rule covering something like this be hard or soft?
- 6) Is there ever a case for allowing multi-part features? I can't think of one myself
- 7) When should a road be represented as two features (for divided highways, boulevards)...should there be some discretion allowed, if so, how much
- 8) Other?

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Re:Centerline Feature Representation

Posted by Joe Borgione - 2009/05/11 13:36

1. My vote would be for jurisdictional boundaries. All the others could be taken care of using dynamic segmentation, don't you think?
2. You have to have them broken at intersections, don't you? How would a network get through if some are and some aren't? There is a freebie tool from ESRI that splits ranges nicely. Look for it at:
<http://arcscrips.esri.com/details.asp?dbid=12808>
3. My vote here goes to when they have a physical barrier separating the two opposing lanes. A jersey barricade or a median strip.
4. This is a real tough one! In the past I've just made cul-de-sacs a single line, with no loop. I'm not sure how else to do it.
5. Again, think about a network application. You sure don't want routes jumping between planes. For me it's thumbs down on any coincident nodes or vertices for overpassing roads.
6. I'm not real familiar with the use of multi-part features, lines or otherwise. I'll pass on this one...

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Re:Centerline Feature Representation

Posted by Gary Christensen - 2009/08/07 11:18

- 1) I'm with Joe on this. It would be good to have them split a jurisdiction boundaries.
- 2) If building a street network requires the centerlines to be split or if it takes a lot of processing to split the arcs from non-broken centerlines, then just leave the centerlines.
The script that Joe referenced looks promising but I have not tried it.
- 3) When paved surfaces area separated with a physical barrier, median, trail, etc.

4) How about two separate arcs that rejoin at the point where left/right address ranges change?

5) & 6) No comments.

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Re:Centerline Feature Representation

Posted by Bert Granberg - 2009/09/10 13:40

What follows is a list of feature representation rules that the USGS is using as part of its Transportation Editing Guidelines (document dating from 20090710). These guidelines are for primarily for editing highway system features so it is not a complete list and doesn't seem to address local issues like boulevards, cul-de-sacs, etc. The document itself claims to be proprietary info so I am not posting it in its entirety but will instead summarize the relevant parts.

I am not advocating on behalf of these rules but I think they make for good additions to the list of considerations.

Also, I have added a few comments and questions in italics within square brackets.

1. Positional Accuracy

- Features must be within 30 feet of the center of the road on the source imagery.
- The positional accuracy of the data shall meet the requirement that at least 95 percent of selected well-defined points will be within 7.6 meters of true ground position.

2. General Geometry

- Road network should not contain physical or attribute gaps.
- Centerlines must follow the character of the road by generally tracking the imagery, even if the feature is visually offset from the imagery. Interstate and US highways are engineered, straight sections must be straight with few vertices; curved sections must be curved with more vertices.

Coordinate density shall be suitable for viewing at 1:24,000-scale such that curves do not appear to have angular geometry and straight runs will not appear to have angles.

Do NOT use "stream-mode" when collecting features

3. Intersections

- All features captured, whether at-grade or over/under-passing, with a junction (e.g. node) at each intersection.

4. Divided Highways

- Divided highways must be separated by a physical or "hard" barrier, such as raised concrete barriers or median strips that can contain grass, dirt, rocks, or landscaping. Collect each direction as a single line. "Hard" barriers always impede legal traffic flow.
- One-mile Rule: Do not revise existing divided highways less than one mile in length that closely match the imagery and are collected correctly, but new divided highways less than one mile in length will be collected as a single line.
- Highways with "soft" barriers, such as dashed or solid yellow lines, turn lanes or flat rumble strips, or are not considered divided highways and will be collected as a single line. "Soft" barriers never impede legal traffic flow.
- Intersections along an unlimited-access divided highway - Collect the short line segment between the divided lanes if there is a gap in the median strip that allows access to both lanes from a side road.

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5. Permanent ID's

Each line segment has its own unique Permanent ID. Duplicate Permanent IDs are created when splitting an existing line segment. Splitting a line segment multiple times creates multiple duplicate Permanent IDs. Duplicate IDs cannot exist in the database so it is critical to delete all duplicate IDs but one.

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Re:Centerline Feature Representation

Posted by Joe Borgione - 2009/09/10 15:28

Like yourself, I see the intersection representation as dicey given their description. Also, as we have experienced, the global id is really good for replication and little else. Somehow a unique-id needs to be calculated.

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Re:Centerline Feature Representation

Posted by Bert Granberg - 2009/09/10 15:32

One more resource: OpenStreetMap.org has a set of guidelines on their wiki for their cloud-driven graphic-based mapping efforts:

http://wiki.openstreetmap.org/wiki/Editing_Standards_and_Conventions

Interesting but perhaps not extremely relevant to GIS-based centerline modeling.

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